Amendments to the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

1. (Currently Amended)   A method of fitting a plurality of sub-population functions to <u>digital image</u> data, comprising the steps of:

defining a plurality of functions according to a plurality of function parameters and a total number of functions;

generating <u>a model</u> ~~an objective function~~ based on said plurality of function parameters;

determining ~~a~~ <u>an objective function for the</u> fitting error between said <u>model</u> ~~objective function~~ and the ~~data, and~~ <u>data;</u>

comparing said fitting error to stopping criteria to determine if said <u>stopping criteria</u> ~~fitting error~~ is satisfied<u>; and</u>

<u>if, at said comparing step, said fitting error does not satisfy said stopping criteria, then altering said plurality of function parameters and said total number of functions and repeating said generating, determining, and comparing steps if, at said comparing step, said fitting error does not satisfy said stopping criteria.</u>

2. (Currently Amended)   The method of Claim 1 <u>wherein said model is defined as a vector representation of said plurality of function parameters.</u> ~~further comprising the step of altering said plurality of function parameters and said total number of functions and repeating said generating, determining, and comparing steps if, at said comparing step, said fitting error does not satisfy said stopping criteria.~~

3. (Original)   The method of Claim 1 further comprising the steps of specifying at least a first threshold value delineating said plurality of functions.

4. (Original)   The method of Claim 3 wherein said at least a first threshold value is calculated based upon the likelihood of misclassification of data.

5. (Original)   The method of Claim 3 further comprising the step of segmenting the data according to said at least a first threshold value.

6. (Original)   The method of Claim 1 wherein said objective-function is defined as a vector representation of said plurality of function parameters.

7. (Original)   The method of Claim 2 wherein said altering step is accomplished by evolving said plurality of function parameters and said total number of functions according to a genetic algorithm.

8. (Original)   The method of Claim 7 wherein said genetic algorithm evolves said plurality of function parameters through mutation and crossover.

9. (Original)   The method of Claim 1 wherein said plurality of functions are normal distributions, and said plurality of functions parameters include the mean and standard deviations of said normal distributions.

10. (Original)   The method of Claim 1 wherein said comparing step includes the utilization of a statistical f-test to evaluate the relative contribution of each of said plurality of functions in comparison of said fitting error and the data.

11. (Original)   The method of Claim 1 wherein the data is organized as a histogram.

12. (Original)   The method of Claim 1 wherein said stopping criteria are defined by a fitness function.

13. (Currently Amended)   The method of Claim 12 wherein said fitness function is optimized to minimize the magnitude of the fit error between said model objective function and the data.

14. (Currently Amended)   An apparatus for fitting a plurality of sub-population functions to digital image data, comprising:
     means for defining a plurality of functions according to a plurality of function parameters and a total number of functions;
     means for generating an objective function based on said plurality of function parameters;

means for determining a fitting error between said objective function and the data~~;, and~~

means for comparing said fitting error to stopping criteria to determine if said stopping criteria ~~fitting error~~ is satisfied; and

means for altering said plurality of function parameters and said total number of functions if said means for comparing determines that said fitting error is not satisfied, said apparatus operable to said generating, determining, and comparing operations.

15. (Currently Amended)   The apparatus of Claim 14 wherein said model is defined as a vector representation of said plurality of function parameters ~~; further comprising means for altering said plurality of function parameters and said total number of functions if said means for comparing determines that said fitting error is not satisfied, said apparatus operable to said generating, determining, and comparing operations~~.

16. (Original)   The apparatus of Claim 14 further comprising means for specifying at least a first threshold value delineating said plurality of functions.

17. (Original)   The apparatus of Claim 16 wherein said at least a first threshold value is calculated based upon the likelihood of misclassification of data.

18. (Original)   The apparatus of Claim 16 further comprising means for segmenting the data according to said at least a first threshold value.

19. (Original)   The apparatus of Claim 14 wherein said objective function is defined as a vector representation of said plurality of function parameters.

20. (Original)   The apparatus of Claim 15 wherein said means for altering operation is accomplished by evolving said plurality of function parameters and said total number of functions according to a genetic algorithm.

21. (Original)   The apparatus of Claim 20 wherein said genetic algorithm evolves said plurality of function parameters through mutation and crossover.

22. (Original)   The apparatus of Claim 14 wherein said plurality of functions are normal distributions, and said plurality of functions parameters include the mean and standard deviations of said normal distributions.

23. (Original)   The apparatus of Claim 14 wherein said means for comparing includes the utilization of a statistical f-test to evaluate the relative contribution of each of said plurality of functions in comparison of said fitting error and the data.

24. (Original)   The apparatus of Claim 14 wherein the data is organized as a histogram.

25. (Original)   The apparatus of Claim 14 wherein said stopping criteria are defined by a fitness function.

26. (Original)   The apparatus of Claim 25 wherein said fitness function is optimized to minimize the magnitude of the fit error between said objective function and the data.

Claims 27 - 44 (Cancelled)

45. (New Claim) A method of specifying thresholds for segmenting a digital image, comprising the steps of:

producing a histogram of the image, the histogram having histogram data;

defining a mixture model as a combination of a plurality of subpopulations; wherein each subpopulation is a function defined according to a plurality of function parameters;

defining a chromosome to be a vector encoding of the mixture model wherein the elements of the vector encode the plurality of function parameters of the plurality of subpopulations;

forming a generation; wherein a generation comprises a plurality of chromosomes and a master chromosome;

for each chromosome in the generation, performing the following steps:

determining the fitting error between the mixture model defined by the chromosome and the histogram data;

determining a measure of the relative contributions of the individual sub-populations defined by the chromosome; and

determining a fitness value based on said fitting error and said measure of relative contributions;

comparing said fitness values to stopping criteria;

altering said chromosomes and repeating said producing, first and second defining, and forming steps, if none of said fitness values satisfies said stopping criteria; and

specifying at least a first threshold value delineating said sub-populations in the mixture model if at least one of said fitness values satisfies said stopping criteria.

46. (New Claim) The method of Claim 45 wherein said at least a first threshold value is calculated based upon the likelihood of misclassification of said histogram data.

47. (New Claim) The method of Claim 45 wherein said model is defined as a vector representation of said plurality of function parameters.

48. (New Claim) The method of Claim 45 wherein said altering step is accomplished by evolving said plurality of function parameters and said total number of functions according to a genetic algorithm.

49. (New Claim) The method of Claim 48 wherein said genetic algorithm evolves said plurality of function parameters through mutation and crossover.

-10-

50. (New Claim) The method of Claim 45 wherein said plurality of functions are normal distributions, and said plurality of functions parameters include the mean and standard deviations of said normal distributions.

51. (New Claim) The method of Claim 45 wherein said comparing step includes the utilization of a statistical f-test to evaluate the relative contribution of each of said plurality of functions in comparison of said fitting error and the data.

52. (New Claim) The method of Claim 45 wherein said stopping criteria are defined by a fitness function.

53. (New Claim) The method of Claim 52 wherein said fitness function is optimized to minimize the magnitude of the fit error between said objective function and the data.

54. (New Claim) An apparatus for specifying thresholds for segmenting a digital image, comprising the steps of:

means for producing a histogram of the image, the histogram having histogram data;

means for defining a mixture model as a combination of a plurality of subpopulations; wherein each subpopulation is a function defined according to a plurality of function parameters;

means for defining a chromosome to be a vector encoding of the mixture model wherein the elements of the vector encode the plurality of function parameters of the plurality of subpopulations;

means for forming a generation; wherein a generation comprises a plurality of chromosomes and a master chromosome;

for each chromosome in the generation, means for performing the following steps:

determining the fitting error between the mixture model defined by the chromosome and the histogram data;

determining a measure of the relative contributions of the individual sub-populations defined by the chromosome; and

determining a fitness value based on said fitting error and said measure of relative contributions;

means for comparing said fitness values to stopping criteria;

means for altering said chromosomes and repeating said producing, first and second defining, and forming steps, if none of said fitness values satisfies said stopping criteria; and

means for specifying at least a first threshold value delineating said sub-populations in the mixture model if at least one of said fitness values satisfies said stopping criteria.